

INFANT MORTALITY AND SOCIOECONOMIC STATUS AMONG OHIO COUNTIES, 1969-1971¹

EDWARD G. STOCKWELL, Department of Sociology, Bowling Green State University, Ohio 43403
KAREN A. LAIDLAW, Department of Sociology, Indiana University Northwest

Abstract. Infant mortality rate as an index of levels of social and economic well being in Ohio was studied using the 1972 *County and City Data Book* (U.S. Bureau of Census, 1973) as the primary data source. Infant mortality rates were fairly high in counties with more than 100,000 people even though these counties were in the highest average income class. This was due, in part, to the large minority population of lower economic status found in metropolitan centers. The inverse relation found between infant mortality and income level was more pronounced in counties with 50,000 to 99,999 individuals than in counties with less than 50,000 population.

OHIO J. SCI. 77(2): 72, 1977

Historically, the infant mortality rate has generally been regarded as the most sensitive index of differences in the levels of social and economic well-being among various geographic areas or population sub-groups (Newsholme 1910; Woodbury 1925). While it has been demonstrated consistently that infant mortality is still very sensitive to gross socioeconomic differences on an international level (Stockwell 1960, 1966; Ekanem 1972; Stockwell and Hutchinson 1975), there is some question as to the precise status of the traditional inverse relationship within an advanced, relatively low mortality country such as the United States. Several years ago two studies presented evidence to indicate that this relationship was changing (Willie 1959; Stockwell 1962). Specifically, it was suggested that where infant mortality was low, and where the major proportion of infant deaths occur in the neonatal period and are attributed to endogenous causes (e.g., immaturity, birth injury, congenital malformations, postnatal asphyxia), the traditional negative correlation between infant mortality and socioeconomic status would be blunted (National Center for Health Statistics 1966a). On the other hand, for those few deaths that take place between the ages of one month and one

year (post-neonatal deaths), where the major causes of death are farther removed from the physiological processes of gestation and birth, mortality levels continued to exhibit an inverse relationship to socioeconomic status. The conclusions reached a decade ago were that:

- (1) the apparent blunting of the overall infant mortality/socioeconomic status relationship attested to the success of public health measures and the effectiveness of improved medical technology for combating the major infectious causes of death
- (2) further progress in the public health and medical professions could, by contributing to still greater reductions in the proportion of infant deaths occurring during the post-neonatal period, blunt the traditional association even further—and perhaps even eliminate it (Stockwell, 1962).

An examination of the findings and conclusions of more recent studies reveals that there is some lack of agreement. Although a longitudinal study of infant mortality in the Chicago area showed a marked narrowing of the socioeconomic differential between 1930 and 1960 (Kitagawa and Hauser, 1973), other data for New York City (National Academy of Sciences, 1973), Toledo, Ohio (Adamchak *et al.*, 1976) and for the nation as a whole

¹Manuscript received May 26, 1976 and in revised form October 25, 1976 (#76-94).

(Kitagawa and Hauser, 1973; National Center for Health Statistics, 1972), suggest that the traditional negative relationship is just as pronounced as ever. Furthermore, other research has indicated that the inverse relationship is also characteristic of the *neonatal* component of infant mortality, not only in the United States (Shapiro *et al.*, 1968; Shin, 1975) but in other industrialized low income countries (National Center for Health Statistics, 1966b; 1968a; 1968b). Finally, in at least one recent study there is evidence of a *positive* association between post-neonatal mortality and economic status (Shin, 1975).

There seems to be a lack of consistency among conclusions pertaining to the relationship between infant mortality and socioeconomic status. This reflects the fact that the studies cited were based on a variety of units of analysis (matched records, census tracts, states) and employed different measures of socioeconomic status (mother's education, father's occupation, family income). There may be real differences among different population groups studied, as well as changes that have occurred over a period of time. This is clearly a topic where additional research is needed. Staff members of the Department of Sociology at Bowling Green State University have recently begun a longitudinal study of the relationship between the various components of infant mortality (total, neonatal, and post-neonatal) and selected measures of socioeconomic status. In this paper we report on one phase of this study—the investigation of the relationship between infant mortality and the 1970 income status of the 88 counties of Ohio.

METHODS AND RESULTS

Using data from the 1972 *County and City Data Book* (U.S. Bureau of the Census, 1973), the first step in the analysis was to group the 88 Ohio counties into three broad classes on the basis of the percentage of families with income below the officially defined poverty level. (See footnote 1, table 1). County infant deaths for the three years 1969–71, and live births for 1970 were then obtained from the annual vital statistics reports

of the Ohio Department of Health and allocated to the appropriate economic grouping. Conventional three-year average infant mortality rates (total, neonatal and postneonatal) were then calculated as the number of deaths per 1,000 live births in each of the three classes (see table 1). Inspection of these rates

TABLE 1

*Infant mortality levels for counties grouped according to poverty status: Ohio, 1967–71**

Families with income below poverty line**	Infant mortality rates†		
	Total	Neo-natal	Post-neonatal
Less than 10% (56)	18.0	13.8	4.2
10% to 14% (18)	18.4	14.4	4.0
15% or more (14)	19.3	15.5	3.8
All counties (88)	18.3	14.2	4.1

*The poverty index currently in use by the Bureau of the Census is one that provides a range of income cutoffs based on family size and composition. In 1970, for example, the poverty thresholds ranged from \$1,487 for a female age 65 and over living alone on a farm, to \$6,116 for a nonfarm family of seven or more persons. The *average* poverty cutoff for a nonfarm family of four with a male head was \$3,745.

**Numbers in parentheses are the number of counties in each economic area.

†Deaths per 1,000 live births.

reveals that, although the differential is not very pronounced, an inverse pattern does indeed characterize the relationship between county income status and the overall infant mortality rate. What is most surprising, however, is that the Ohio data indicate that the inverse relationship is limited to the neonatal period. On the other hand, and in agreement with the findings of at least one other recent study (Shin, 1975), postneonatal mortality levels appear to be directly related to economic status. It would appear that the changing pattern of the infant mortality/socioeconomic status relationship postulated earlier has not been realized as yet.

In dealing with areal units as large as counties, relationships such as that between infant mortality and socioeconomic status may be blunted by the heterogeneous nature of large populations. In

an effort to control for this possibility, counties were grouped into four broad size classes and total infant mortality rates were re-calculated for the three income groups (see table 2). Two interesting observations can be drawn from these data. Infant mortality rates are fairly high among the larger counties (100,000 and over) even though all of the counties in these size categories were in the highest income class. This situation may be explained in part by the ethnic composition of the larger counties relative to that of the smaller. It is in the larger counties with the large metropolitan centers that ethnic minority populations, particularly blacks, are concentrated. It may be that the higher overall infant mortality rate of the black population, a fact that reflects their generally lower economic status (Stockwell, 1968), contributes disproportionately to the overall level of infant mortality in these larger counties. Ideally we should explore the infant mortality relationship separately for whites and blacks but unfortunately the data available in the published sources did not permit this. As our research proceeds, however, this white/black differential will be examined more closely.

The inverse association between infant mortality and income level was more pronounced in the medium size counties (50,000-99,999) than in the smaller ones (under 50,000). In this case, we suggest that the narrow range of the relationship among the smaller counties may be a function of their overall lower economic

status relative to that of the other size classes. To illustrate, the percentage of counties in the highest economic category is only 48% for the "Under 50,000" size class as compared to 63% for the medium size class, and 100% for counties with over 100,000 population.

DISCUSSION

The data presented clearly reveal the existence of an inverse relationship between infant mortality and income level among Ohio counties for the period 1969-1971. In particular, they reinforce the findings of other recent studies that suggest that socioeconomic variations with respect to neonatal mortality are just as pronounced, if not more so, than those pertaining to postneonatal mortality. We hasten to add, however, that our analysis to date has been limited in scope and does not pretend to offer answers to all the questions that can be raised concerning the relationship between infant mortality and socioeconomic status. In addition to the factors we have already mentioned concerning the importance of ethnic composition and population size for the infant mortality/socioeconomic status relationship, our research is now focusing on such questions as:

1. Does the neonatal/postneonatal differential characterize all segments of the population (white-black, male-female, urban-rural)?
2. What causes of death can be isolated as explaining observed differences?

TABLE 2
*Infant mortality rates among counties grouped according to population size and poverty status: Ohio, 1969-71.**

Families with income below poverty line	Population size				
	All Counties	500,000 and over	100,000 to 499,999	50,000 to 99,999	Under 50,000
Less than 10%	18.0 (56)	18.2 (5)	18.3 (14)	16.9 (15)	17.7 (21)
10-14%	18.4 (18)	—	—	18.1 (7)	18.9 (11)
15% or more	19.3 (14)	—	—	19.9 (2)	19.0 (12)
All counties	18.3 (88)	18.2 (5)	18.3 (14)	17.5 (24)	18.3 (44)

*Numbers in parentheses are the number of counties in each cell. Rates are number of deaths per 1,000 live births. Dash (—) indicates no counties in that cell.

3. What effect does the use of alternative measures of socioeconomic status have on the nature and extent of the mortality relationship?

4. What differences, if any, exist among areas characterized by differences in economic bases or functions?

These and other questions will be considered more fully in the larger study now underway. Meanwhile, we can conclude that in spite of continued advances in medicine and public health, and even though the observed relationships were not very pronounced, our data show that completely equal life chances still do not prevail in our society today.

LITERATURE CITED

- Adamchak, Donald J., Robert E. Siegel and Edward G. Stockwell. 1976. Infant Mortality and Socioeconomic Status, *Ohio's Health* 28: 8-9.
- Ekanem, Ita I. 1972. A further note on the relation between economic development and fertility. *Demography* 9: 382-298.
- Kitagawa, Evelyn M. and Philip M. Hauser. 1973. *Differential Mortality in the United States: A Study in Socio-economic Epidemiology*. Cambridge: Harvard Univ. Press. pp. 28-29 and 66-67.
- National Academy of Sciences. 1973. *Infant Death: An Analysis by Maternal Risk and Health Care*. Washington, D.C.: Institute of Medicine.
- National Center for Health Statistics. 1966a. *Infant, Fetal, and Maternal Mortality*. Vital and Health Statistics. Series 20, No. 3. U.S. Govern. Print. Office. Washington, D.C.
- . 1966b. *Infant and Perinatal Mortality in Scotland*. Vital and Health Statistics. Series 3, No. 5. U.S. Govern. Print. Office. Washington, D.C.
- . 1968a. *Infant Loss in the Netherlands*. Vital and Health Statistics. Series 3, No. 11. U.S. Govern. Print. Office. Washington, D.C.
- . 1968b. *Infant and Perinatal Mortality in England and Wales*. Vital and Health Statistics. Series 3, No. 12. U.S. Govern. Print. Office. Washington, D.C.
- . 1972. *Infant Mortality Rates: Socio-economic Factors*. Vital and Health Statistics. Series 22, No. 14. U.S. Govern. Print. Office. Washington, D.C.
- Newsholme, Arthur. 1910. *Thirty-Ninth Annual Report of the Local Government Board, Report C d 5312*. Darling and Son, London.
- Shapiro, Sam, Edward R. Schlesinger and Robert E. L. Nesbitt, Jr. 1968. *Infant, Perinatal, Maternal, and Childhood Mortality in the United States*. Harvard University Press, Cambridge.
- Shin, Eui Hang. 1975. Black-white differentials in infant mortality in the south, 1940-1970. *Demography* 12: 1-19.
- Stockwell, Edward G. 1960. The measurement of economic development. *Econ. Devel. Cultural Change* 8: 419-432.
- . 1962. Infant mortality and socioeconomic status: a changing relationship. *Milbank Memor. Fund Quart.* 40: 101-111.
- . 1966. Some demographic correlates of economic development. *Rural Sociol.* 31: 216-224.
- . 1968. *Population and People*. Chicago, Quadrangle Books. pp. 55-57.
- and Bruce Hutchinson. 1975. Mortality correlates of economic status. *Population Rev.* 19: 46-50.
- U.S. Bureau of the Census. 1973. *County and City Data Book: 1972*. U.S. Govern. Print. Office, Washington, D.C.
- Willie, Charles V. 1959. A research note on the changing association between infant mortality and socioeconomic status. *Social Forces* 37: 221-227.
- Woodbury, Robert M. 1925. *Causal Factors in Infant Mortality*. United States Department of Labor, Children's Bureau Publication No. 142. U.S. Govern. Print. Office, Washington, D.C.